REMARKS/ARGUMENTS

The currently outstanding Office Action dated September 23, 2004 is designated "Final." For this reason, this paper is being filed with a Request for Continued Examination (RCE), so that prosecution may be re-opened.

Claims 1-18 currently stand rejected. Claims 19-22 which were submitted in a prior amendment filed on June 15, 2004 were not addressed in the Office Action dated September 23, 2004. For at least this reason, the current Office Action is prima facie defective and must be withdrawn.

Claim 1 stands rejected in the current Office Action over the teachings of US Patent 5,794,005 and US Patent 5,850,538 both granted to Steinman, in combination with "SYMPHONY: A Fast Mixed Signal Simulator for BiMOS Analog/Digital Circuits" by Buch et al (hereinafter "Buch reference") and "Non-Integral Event Timing for Digital Logic Simulation" by Ulrich (hereinafter "Ulrich reference").

In rejecting Claim 1, the Examiner stated, in paragraph 2.3 on page 5 of the current Office Action, that hash buckets and heaps are disclosed as, known in the art, methods of managing events in simulations by the Steinman reference. The Examiner further stated that a heap data structure is well known, and cited to the Microsoft Press Computer Dictionary for a definition.

However, in paragraph 2.3 on page 5, the Examiner has not addressed Applicants' argument that "there is no indication whatsoever that the hash buckets are to be used with priority heaps." Applicants are not arguing that heaps or hash buckets are novel when used individually. Instead, Applicant's argument is that a ***combination*** of hash buckets and a heap is not disclosed by Steinman. The Examiner has not shown any prior art disclosure for a heap-hash buckets structure. Moreover, the Examiner has not cited any prior art motivation or suggestion to form such a structure. Therefore, the current Office Action fails to make a prima facie case of obviousness of Claim 1.

Regarding Claim 1, the Examiner also stated, at the bottom of page 7 of the Office Action, in paragraph 3.1, "... using hash buckets (**Figures 4 and 5**), organizing the scheduled times into a priority heap (**Col. 8 Lines 53-58**), associating scheduled times assigned to the events in the buckets (**Figure 3, 4, 5, 6, 7, 8, 9, Col. 8 Lines 27-67, Col. 9**

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Lines 1-51), removing the earliest scheduled time from the heap (**Figure 14 Items 132, 136 and 110, Col. 10 Lines 49-53**)..."

Applicant hereby reproduces Steinman's cited text from **Col. 8 Lines 53-58** below to show that this text in fact teaches away from a priority heap by calling it complicated:

> This simple approach for managing the event list is faster than single-event insertions into linked lists. It can also outperform some of the more complicated data structures such as splay trees and priority heaps, if enough events are collected in the secondary queue on the average for each cycle.

In fact the Examiner-cited text from **Col. 8 Lines 27-67, Col. 9 Lines 1-51** teaches a two-list structure to be used instead:

> The basic idea of this new technique is that two lists are continually maintained. The primary list is sorted, while the secondary list is unsorted. As new events are scheduled, they are put into the secondary list. The earliest event scheduled to occur in the secondary list is preserved. When the time to process this event comes, the secondary list is sorted and then merged into the primary list.
> See column 8 lines 35-38.

As seen from text quoted at the top half of this page which was cited by the Examiner, a two-list structure is described by Steinman as being simpler and faster than a priority heap. This two-list structure is called Qheap. See US Patent 5,850,538 at column 6, lines 14-16. See also US Patent 5,794,005 at column 8, lines 35-41. Steinman'538 expressly distinguishes his two-list structure from a heap in the form of a binary tree as follows.

> The SPEEDES Qheap priority queue data structure of the present invention is built out of linked lists to form the heap. This is different from normal heap data structures that use either fixed arrays or binary trees. Steinman'538 at column 2, lines 31-34.
>
> Instead of describing heaps using binary trees ..., the present invention is embodied in a novel

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> implementation of a heap using only linked lists. The new data structure of the present invention is the preferred embodiment and is referred to as a Qheap. Steinman'538 at column 16, lines 1-9.

Therefore, Steinman'538 teaches away from use of a heap in the form of a binary tree which is now recited in Claim 1. Support for the binary tree in Claim 1 is found in the current application at page 5 lines 32-34 and page 6 lines 1-5.

Even assuming that the combined teachings of the two Steinman patents disclose the use of a binary tree for message processing, there appears to be no motivation to combine it with a hash function. While a hash function is disclosed by Steinman, it is used in processing of anti-messages. See column 10 lines 41-48 of US Patent 5,794,005. Moreover, the Examiner-cited FIGs. 4 and 5 in US Patent 5,794,005 show dashed lines entering the hash buckets, and these dashed lines are documented (in a key) as representing anti-messages. There appears to be no suggestion that Steinman's hash function is to be used in combination with a heap.

Even assuming that there is some prior art suggestion or motivation to combine a hash function with a heap, there appears to be no indication whatsoever in the four different prior art references cited by the Examiner as to whether the combination is to be (a) a heap implemented within each hash bucket or (b) a single heap with nodes that point to individual hash buckets or some combination thereof.

Claim 1 is amended to further distinguish over the combined teachings of the two Steinman patents by requiring the hash function being used to be ***non-order preserving***, which ensures that the buckets have no assigned order relative to one another. For support, see the current patent application at page 5 lines 1-5. Such a hash function is nowhere disclosed or suggested by Steinman in his two patents. In using an order-preserving structure, Steinman merely teaches the use of a time wheel (also called calendar queue) for processing messages, which is well known in the art. None of the cited references discloses or suggests a non-order preserving structure be used in event management, let alone that it be used in combination with a heap of scheduled times and not events, as recited in Claim 1. For support, see the current patent application at page 5, lines 29-30.

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Moreover, as discussed in the current patent application at the bottom of page 3, when the delay between scheduled simulations times can be both very small and very large, and the time needs to be represented as a real number, such representation affects the complexity of the time wheel. Claim 1 addresses this issue by bifurcating scheduled times from the events that occur at these times, by use of two separate data structures (namely heap and hash buckets respectively). See the specification at page 3 line 27 and page 5 lines 2-3. Use of ***real numbers*** to represent scheduled times as per Claim 1 clearly distinguishes over the teachings of "Non-Integral Event Timing for Digital Logic Simulation" by Ulrich (hereinafter "Ulrich reference"), as discussed next.

As noted by the Examiner towards the bottom half of page 6 of the Office action, Ulrich discloses combining a time-mapping table (***time-wheel***) with multiple linear list.... Ulrich provides no indication that a non-order preserving hash function can be used instead of the time-wheel. Therefore Ulrich fails to overcome the above-noted defect in Steinman's teachings.

Moreover, as noted in a prior amendment dated June 15, 2004, although the Ulrich reference mentions non-integral event timing in its title, the method disclosed in "The Event Scheduling Process" (right column on page 61 and bottom half of page 62) subdivides the time axis between two integral times into a "large" number of intervals (Ulrich's example in Fig. 2 uses 8, Ulrich's text states 256 or 512). The implication of these number of intervals is that the Ulrich reference uses an integral time with a higher resolution than a time unit (1/8 for the example, 1/256 or 1/512 for the text). For this reason, the technology of the Ulrich reference suffers from the kind problems described in the current patent application on page 2, e.g. deciding the size of the time wheel, and expensive re-organization of the time wheel. Moreover, there is no indication in the Ulrich reference that the time is represented as a real number which is now explicitly recited in Claim 1.

Also as noted in the prior amendment, Applicants believe that the article "SYMPHONY: A Fast Mixed Signal Simulator for BiMOS Analog/Digital Circuits" by Buch et al (hereinafter "Buch reference") is insufficient to extend the teachings of Steinman and Ulrich to the realm of mixed signal simulation. As previously noted, such a modification would require an **extensive re-design** of a type not disclosed or suggested by the Buch

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reference. The Examiner's response to this argument was that Bush discloses feedback in page 403, right column, in the Bush reference. Then the Examiner relied on Steinman's Figures 15 and 16 and the related disclosure to describe how the feedback would be handled. However, Applicant maintains that handling of feedback by use of Steinman's teachings fails to address several issues, such as timing glitches, that can easily arise in mixed signal circuits and addressing such issues requires an extensive re-design.

Applicant also respectfully traverses the Examiner's motivation for modification of the Steinman Patent is as stated at the bottom of page 8 of the above-identified Office Action, as follows (original emphasis in italics):

> The Steinman reference discloses that there is a need in the simulation art to support *multiple simulation strategies* and *other algorithms* (Col. 17, Lines 46-61). An artisan of ordinary skill in the art, presented with the problem of simulating a mixed signal integrated circuit would ...

Specifically, the Examiner did not respond to the Applicant's argument in the prior amendment that the above-quoted **statement is incorrect**. For this reason, the sixth argument in the amendment dated June 15, 2004 is incorporated by reference herein.

The Examiner also did not respond to Applicant's argument in the prior amendment that there is no indication whatsoever by Steinman or by Buch as to why a skilled artisan, when presented with the problem of simulating a mixed signal integrated circuit, would specifically select the Steinman Patent's scheduling technologies. In the current office action, the Examiner appears to have not responded to Applicant's explicit request to state in the next Office Action, why the Steinman Patent is to be used instead of US 6,324,495 and US 6,466,898. As stated by the Court of Appeals for the Federal Circuit (emphasis added), "[A] rejection cannot be predicated on the mere identification . . . of individual components of claimed limitations. Rather, particular findings must be made as to the reason the skilled artisan, with no knowledge of the claimed invention, would have selected **these components** for combination in the manner claimed." In re Werner Kotzab, 217 F.3d 1365, 1371, 55 USPQ2d 1313, 1317 (Fed. Cir. 2000).

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In view of the above arguments, Applicant respectfully requests the Examiner to withdraw the prior art rejection of Claim 1. Claims 2-18 are also believed to be patentable for one or more of the reasons discussed above.

For one or more of the above reasons, Applicant respectfully requests allowance of all pending Claims 1-18. Should the Examiner have any questions concerning this response, the Examiner is invited to call the undersigned at (408) 982-8200, ext. 3.

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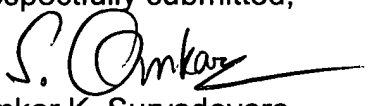
Respectfully submitted,



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